REVISED LIST OF HAWAIIAN PTERIDOPHYTA

BY

CARL CHRISTENSEN

BERNICE P. BISHOP MUSEUM

BULLETIN 25

HONOLULU, HAWAII
PUBLISHED BY THE MUSEUM
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INTRODUCTION

When Dr. Carl Skottsberg, Gothenburg, sent a collection of Hawaiian Pteridophyta made during his visit to the islands in 1922, he asked me not only to examine his collection, but also to prepare a new revised list of all Pteridophyta of the islands with the nomenclature of my Index filicum. At first, it seemed to me unnecessary to publish such a list, as W. J. Robinson[1] recently gave a revision of the Hawaiian Pteridophyta. But in identifying the specimens gathered by Skottsberg, it became apparent that Robinson's revision is in several instances very unsatisfactory, and her keys to the species often misleading. The task of revising the list of Pteridophyta became more difficult than originally believed, mainly because several species are very variable and related ones are connected by intermediate forms. The classical flora of Hillebrand, 1888, gives detailed descriptions of all species known to him, but certain very important characteristics—such as scales and hairs—are seldom described so accurately that confidence may be felt when trying to identify the numerous intricate forms. This statement is perhaps due to my own imperfect knowledge, but I examined a rather large number of Hawaiian forms contained in various herbaria, including several of Hillebrand's own specimens now at Berlin, and everywhere found numerous specimens wrongly determined and often completely misunderstood. A thorough study of the species with all its forms remains to be made before the forms can be said to be well known and well delimitated. I am not able to undertake that work; some of it must be carried out in the field, and some by examining large numbers of dried specimens.

In the critical notes accompanying the list of the species presented (p. 22), I have called the attention of Hawaiian botanists to those species or group of related species which are now poorly understood, such as

[1] A bibliography of works cited appears on page 30.

the species of Asplenium of the cuneatum group (Nos. 81-94) and of the group of A. Kaulfussii. Several species of this genus have always a pronounced inclination to vary in cutting; not rarely, species that normally are pinnate occur with forms having the blade twice or thrice pinnate, but these much divided forms — probably mutants — do not always seem to be stable. Such mutants are, I believe, *A. meiotomum, A. bipinnatum,* and *A. Lydgatei of Hillebrand,* and I am inclined to believe that the obscure plant called *Schizostege Lydgatei Hill.* equally is a mutant, derivate from a species of Pteris (*P. excelsa* Gaud.?).

The systematic value of such aberrant forms can be stated only by studies in the field, where it must be observed whether they occur always as single individuals, or what takes place. Many cut leaves originate from the same rhizome as normal leaves. Cultivation of such forms is, of course, desirable. Plants cultivated under more favorable conditions are often subject to greater variation than those grown naturally. It is hoped that precisely such aberrant forms, occasionally found wild, will arise under cultivation and thus the question of their systematic value be solved definitely. If studies in the field and cultivation fail to solve the question, it is still possible to examine very closely all characters of normal plants, texture of the living frond, venation, form of teeth, structure of scales, hairs, and spores. That minute characters are not so subject to variation as the cutting of the leaf is now generally acknowledged, and modern pteridologists therefore consider them of high systematic value.

Other difficult groups of Hawaiian ferns are the section Parapolystichum of the genus Dryopteris, such as *D. glabra* and *unidentata* (Nos. 38-42); the genus Sadleria; Diellia; the section of Adenophorus of Polypodium; and several others. I also call attention to the very interesting species called *Loxoscaphe Mannii* and *Asplenium Baldwinnii* (p. 27). On the whole, I am of the opinion that too many species of ferns have been described and adopted, especially by Robinson. Several of her species appear to me mere forms of other species; but on the other hand, it is possible that some of Hillebrand's numerous varieties will appear to be good species.

I have also listed some species of which I have no personal knowledge and have added "Rob." to the names of some few synonyms only because the synonymy of the species is rather completely dealt with by Robinson, and it seems undesirable to reprint all these names. The area of all species, as far as it is known, is given. But it should not be forgotten that such statements based on records in literature only, often are very untrustworthy, especially those in the Synopsis filicum of Hooker and Baker.

A great many of the species described by them are now split into two or several species of more confined geographical area. Under most of the numerous endemic species I have noted the location of nearest relatives.

The collection made by Skottsberg contained a few species not hitherto recorded for the islands. Two of them are certainly escapes from gardens: *Pteris longifolia* and *Blechnum occidentale*. *Polypodium phymatodes* is perhaps also an introduced species, but it is the commonest fern in nearly all Polynesian islands, and may possibly be indigenous in Hawaii also. Certainly not introduced, is a fourth addition to the flora, *Elaphoglossum tahitense* Brack., hitherto known from Tahiti, Easter Island, and Fiji.

A SYSTEMATIC LIST OF ALL HAWAIIAN PTERIDOPHYTA

OPHIOGLOSSACEAE

1. **Ophioglossum concinnum** Brackenridge, Rob. vol. 39, p. 234.—*O. nudicaule* Hill., p. 640, *O. vulgatum* Hill., p. 640.

Endemic, but perhaps not specifically distinct from similar forms occurring in most Polynesian islands.

2. **O. pendulum** Linnaeus, Hill. p. 640.—*Ophioderma pendulum* Presl, Rob. vol. 39, p. 235.

Tropical Asia, Australia and Polynesia, African Islands in the Indian Ocean.

3. **Botrychium subbifoliatum** Brackenridge, Hill. p. 641; Rob. vol. 39, p. 234. pl. 18.

Endemic, several related species in northwestern America and northeastern Asia, others in the Southern Pacific.

MARATTIACEAE

4. **Marattia Douglasii** (Presl) Baker, Hill. p. 542, Rob. vol. 39, p. 237.

Hillebrand says that this species "occurs also on the Viti Islands," but I have not seen this statement confirmed and believe that it is endemic in the Hawaiian Islands. It is widely different from the other Polynesian species of the genus, *M. melanesica* Kuhn from New Britannia only excepted, but is rather near some species from Tropical America.

SCHIZAECEAE

5. **Schizaea robusta** Baker, Hill. p. 543, Rob. vol. 39, p. 238.

Endemic (?), a form from Tahiti not seen by me, is supposed by Baker (Syn. Fil.) to be the same as *S. robusta.* This is closely related to but apparently specifically distinct from *S. fistulosa* Labill. of Australia and New Zealand; similar forms occur in Southern Chile (*S. chilensis* Philippi) and the Falkland Islands (*S. australis* Gaudichaud) both generally referred to *S. fistulosa.*

GLEICHENIACEAE

*6. **Gleichenia glauca** (Thunberg) Hooker.—*Gl. longissima* Blume, Hill. p. 544. *Dicranopteris glauca* and *D. glabra,* Rob. vol. 39, pp. 239-240.

Widely spread in many forms or subspecies through Eastern and Tropical Asia, Australia and Polynesia, reaching northward to Japan. A

[2] Species marked by an asterisk are mentioned under Critical Notes, p. 22.

related species *G. Bancroftii* Hooker occurs in tropical America. These two species make a separate section of the genus: *Diplopterygium* Diels.

7. **G. linearis** (Burmann) Clarke.—*G. dichotoma* Hooker, Hill. p. 544 (excel. var.). *Dicranopteris linearis* Underwood, Rob. vol. 39, p. 240.

In nearly all tropical and subtropical countries.

8. **G. emarginata** (Brackenridge) Moore.—(*G. dichotoma* B, Hill. p. 545) *Dicranopteris emarginata* Rob. vol. 39, p. 240.

Endemic.

9. **G. owhyhensis** Hooker.—*G. Hawaiiensis* Hill. p. 544, *Dicranopteris owhyhensis* Rob. vol. 39, p. 241.

Endemic. Several closely related species in tropical America, the other Polynesian species of this section (*Holopterygium Diels*) are more different.

CYATHEACEAE

10. **Cibotium Menziesii** Hooker, Hill. p. 546, Rob. vol. 39, p. 243.

11. **C. Chamissoi** Kaulfuss, Hill. p. 547, Rob. vol. 39, p. 243.

12. **C. glaucum** (Smith) Hooker et Arnott, Hill. p. 547, Rob. vol. 39, p. 244.

All three species endemic; one species of this small genus, *C. barometz* (Linnaeus) with several varieties, is found in tropical and subtropical Asia, and three or four others occur in Central America. All are closely related.

HYMENOPHYLLACEAE

13.* **Trichomanes saxifragoides** Presl.—*T. parvulum* Hill. p. 635, Robinson vol. 39, p. 245.

Polynesia (tropical and subtropical Asia?).

14. **Trichomanes Draytonianum** Brackenridge, Hill. p. 635.—*T. humile* Rob. vol. 39, p. 246.

Endemic. Perhaps a form of the common Polynesian *T. humile* Forster.

15. **T. cyrtotheca** Hillebrand, Hill. p. 636, Rob. vol. 39, p. 246, pl. 19.

Endemic; related to the next.

Hawaii: W. of Olaa, Hiulani forest, Skottsberg, No. 438! New to this island?

16. **T. davallioides** Gaudichaud, Hill. p. 636.—*T. radicans* Rob. vol. 39, p. 246, pl. 20.

An endemic subspecies of the wide spread *T. radicans* Swartz. Variable in cutting.

17. **T. Bauerianum** Endlicher, Rob. vol. 39, p. 245.—*T. meifolium* Blume (non Bory), Hill. p. 637.
Malaya and Polynesia.

18. **Hymenophyllum recurvum** Gaudichaud, Hill. p. 638, Rob. vol. 39, p. 247.
Endemic; allied to *H. cuneatum* from Juan Fernandez and Southern Chile, and *H. Blumeanum* Pr., the Polynesian-Malayan representative of *H. polyanthos*. Very similar species are found in all tropical countries.

19.* **H. obtusum** Hooker et Arnott, Hill. p. 638, Rob. vol. 39, p. 248.
Endemic.

20.* **H. lanceolatum** Hooker et Arnott, Hill. p. 638, Rob. vol. 39, p. 248.

21. **H. Baldwinii** Eaton, Hill. p. 639, Rob. vol. 39, p. 247.
Endemic.

POLYPODIACEAE

22. **Cystopteris Douglasii** Hooker, Hill. p. 580.—*Filix Douglasii* Rob. vol. 39, p. 587.
Endemic. A subspecies of the world-wide *C. fragilis* (Linnaeus) Bernh.

23. **Dryopteris** (Lastrea) **globulifera** (Brackenridge) O. Kuntze, Rob. vol. 39, p. 591.—*Aspidium globuliferum* Mann, Hill. p. 573.
Endemic. Related forms in most temperate and tropical countries; for example, *D. oreopteris* Maxon in Europe, North America, and East Asia.

24. **D. Keraudreniana** (Gaudichaud) C. Christensen, Rob. vol. 39, p. 596. —*Phegopteris Keraudreniana* Mann, Hill. p. 561.
Endemic.

25. **D. rubiformis** Rob. vol. 39, p. 596.—*Phegopteris Keraudreniana* var. *procera* Hill. p. 562.
Endemic. A variety of the former species, I think.

26. **D. sandwicensis** (Hooker et Arnott) C. Christensen Rob. vol. 39, p. 598, *Phegopteris sandwicensis* Mann, Hill. p. 565.
Also on Fiji and on Pitcairn Islands.
The relationship of the three last species is doubtful; *D. sandwicensis* approaches certain forms of *D. connexa* (Kaulfuss) from Brazil.

27. **D.** (Cyclosorus) **parasitica** (Linnaeus) O. Kuntze, Rob. vol. 39, p. 598.
In nearly all tropical and subtropical countries.

28. **D. gongylodes** (Schkuhr) O. Kuntze.—*Aspidium unitum* Swartz, Hill. p. 573, *Dryopteris propinqua* (R. Brown) Gilbert, Rob. vol. 39, p. 598.

In nearly all tropical countries.

29.* **D. truncata** (Gaudichaud) O. Kuntze, Rob. vol. 39, p. 601.—*Aspidium truncatum* Gaudichaud, Hill. p. 572.

Tropical Asia and Polynesia.

30. **D. cyatheoides** (Kaulfuss) O. Kuntze, Rob. vol. 39, p. 599.—*Aspidium cyatheoides* Kaulfuss, Hill. p. 571.

Probably endemic, although it is recorded from Samoa, New Guinea and Sumatra; in Malaya and Melanesia-Polynesia related species occur.

31.* **D. stegnogrammoides** (Baker) C. Christensen, Rob. vol. 39, p. 600. —*Phegopteris polycarpa* (Hooker et Arnott) Hill, p. 560.

Endemic.

32.* **D.** (Eudryopteris) **paleacea** (Swartz) C. Christensen, Am. Fern Journ. vol. 1, p. 94, 1911, Mon. Dryopteris I, vol. 10, p. 67; Rob. vol. 39, p. 591.—*Aspidium filix mas var. parallelogrammum* Kuntze, Hill. p. 574.

var. **fusco-atra** (Hillebrand), *D. fusco-atra* (Hillebrand) Rob. vol. 39, p. 592, pl. 42.

Tropical America. Closely related forms in Asia.

33.* **D.** (Eudryopteris) **hawaiiensis** (Hillebrand) Rob. vol. 39, p. 594.— *Aspidium hawaiiense* Hill. p. 573.

Endemic.

34.* **D.** (Ctenitis) **squamigera** (Hooker et Arnott) Hooker, Rob. vol. 39, p. 594.—*Aspidium squamigerum* Mann, Hill. p. 578.

Endemic? Recorded also for Fiji and Society Islands, but the plants from these islands are scarcely identical with the Hawaiian form.

35. **D.** (Ctenitis) **rubiginosa** (Brackenridge) O. Kuntze, Rob. vol. 39, p. 594.—*Aspidium rubiginosum* Mann, Hill. p. 577.

Endemic. Related species in Central Polynesia.

36.* **D.** (Ctenitis) **latifrons** (Brackenridge) O. Kuntze, Rob. vol. 39, p. 593.—*Aspidium latifrons* Mann, Hill. p. 578.

37.* **D.** (Ctenitis) **honolulensis** (Hooker) C. Christensen, Rob. vol. 39, p. 595.—*Phegopteris Hillebrandii* (Hooker) Hill. 566.

Endemic.

38.* **D. glabra** (Brackenridge) O. Kuntze, Rob. vol. 39, p. 592.—*Aspidium glabrum* Mettenius, Hill. p. 576. *Dryopteris nuda* Underwood, Rob. vol. 39, p. 592, pl. 43.

Endemic.

39.* **D. parvula** Rob. vol. 39, p. 593, pl. 44.—*Aspidium glabrum* var. *pusillum,* Hill. p. 577.

Endemic.

40.* **D. crinalis** (Hooker et Arnott) C. Christensen, Rob. vol. 39, p. 595. —*Phegopteris crinalis* Mann, Hill., p. 563.

Endemic.

41.* **D. unidentata** (Hooker et Arnott) C. Christensen, Rob. vol. 39, p. 597. —*Phegopteris unidentata* Mann, Hill., p. 564.

Endemic.

42.* **D. acutidens** C. Christensen, Rob. vol. 39, p. 597.—*Phegopteris spinulosa* Hill., p. 566.

Endemic.

43.* **D.** (Polystichopsis) **carvifolia** (Kuntze) C. Christensen, comb. nov. —*Polystichum carvifolium* (Kuntze) C. Christensen, Index Filicum, Rob. vol. 40, p. 203.—*Aspidium aristatum* Sw. var. *coniifolium* Wall., Hill, p. 569.

Tropical and subtropical East Asia, Polynesia, Tropical Australia.

44.* **Polystichum haleakalense** Brackenridge, Rob. vol. 40, p. 203.— *Aspidium aculeatum* var. *Braunii* Hill., p. 568.

Endemic.

45. **P. Hillebrandii** Carruthers, Rob. vol. 40, p. 204.—*Aspidium Hillebrandii* Hill., p. 568.

Endemic. Unknown to me, said to be one of the very numerous forms of the world-wide collective-species *P. aculeatum* (L.).

46.* **Cyrtomium Boydiae** (D. C. Eaton) Rob. vol. 40, p. 204, pl. 10.— *Aspidium cyatheoides* var. *depauperatum* Hill. p. 572.

Endemic.

47. **C. caryotideum** (Wallich) Presl., Rob. vol. 40, p. 204.—*Aspidium caryotideum* Wallich, Hill. p. 569.

East Asia, Himalaya, South Africa.

48. **Tectaria Gaudichaudii** (Mettenius) Maxon: Biol. Soc. Washington Proc., vol. 36, p. 173, 1923.—*Aspidium Gaudichaudii* Mettenius Kuhn, Linnæa, vol. 36, p. 123, 1869.—*A. apiifolium* Hill. p. 570, *Tectaria cicutaria* Rob. vol. 40, p. 205.

Endemic. Closely allied species in most tropical countries; it is often included in the collective species *T. cicutaria.*

49. **Nephrolepis exaltata** (Linnaeus) Schott, Hill. p. 579, Rob. vol. 39, p. 584.

Cosmopolitan within the tropics.

50.* **Diellia centifolia** (Hillebrand) Diels, Rob. vol. 39, p. 580.—*Lindsaya centifolia* Hill. p. 621.

Endemic.

51. **D. pumila** Brackenridge, Rob. vol. 39, p. 580.—*Lindsaya pumila,* Hooker, Hill. p. 620.

Endemic.

52. **D. erecta** Brackenridge, Rob. vol. 39, p. 581.—*Lindsaya erecta,* Hill. p. 621.

Endemic.

53. **D. Alexandri** (Hillebrand) Diels, Rob. vol. 39, p. 581.—*Lindsaya Alexandri,* Hill., p. 622.

Endemic.

54. **D. falcata** Brackenridge, Rob. vol. 39, p. 581.—*Lindsaya falcata,* Hill. p. 620.

Endemic.

55. **D. laciniata** (Hillebrand) Diels, Rob. vol. 39, p. 581.—*Lindsaya laciniata,* Hill. p. 621.

Endemic.

56. **D. Knudsenii** (Hillebrand) Diels. Rob. vol. 39, p. 582.—*Lindsaya Knudsenii,* Hill. p. 623.

Endemic.

57.* **Lindsaya repens** (Bory) Beddome, var. **Macraeana** (Hooker et Arnott) C. Christensen.—*Odontoloma repens* Descaux, Hill. p. 625. *O. Macraeanum* Brackenridge, Rob. vol. 39, p. 582.

The variety is endemic, the species is common in Malaya and Polynesia.

58. **Odontosoria chinensis** (Linnaeus) J. Smith, Rob. vol. 39, p. 585.—*Microlepia tenuifolia* Mettenius, Hill. p. 626.

Tropical Asia and Polynesia, East-Asia to Japan, Madagascar, Mascarene Isl.

59. **Microlepia strigosa** (Thunberg) Presl, var. **hirta** (Kaulfuss), Hill., p. 625.—*M. strigosa* Rob. vol. 39, p. 585.

The variety probably endemic, the species is widely-spread through East and South Asia, Polynesia and tropical Australia.

60. **M. speluncae** (Linnaeus) Moore, Rob. vol. 39, p. 585.—*M. jamaicensis* Hill. p. 626; *Leptolepia Andersoni* Mettenius (C. Christensen. Index f., p. 389).

In all tropical countries of the Old World, perhaps also in America.

61.* **Athyrium proliferum** (Kaulfuss) C. Christensen, Rob. vol. 40, p. 221.—*Asplenium deparioides* Hill. p. 614.

Endemic. Not nearly related to any other species of the genus.

62.* **A. Poiretianum** (Gaudichaud) Presl, Rob. vol. 40, p. 221.—*Asplenium aspidioides* Hill. p. 617. *Aspl. multisectum* Brack.

Endemic. Related species in the South American Andes (*A. reductum* Christ.) and in Africa (*A. scandicinum* [Willd.] Pr.)

63. **Diplazium molokaiense** Rob. vol. 40, p. 223.—*Asplenium arboreum* Hill. p. 609.

Endemic. (Oahu, Skottsberg, No. 396.)

64. **D. marginale** (Hillebrand) C. Christensen, Rob. vol. 40, p. 223.—*Asplenium marginale* Hill. p. 613.

Endemic.

65. **D. Fenzlianum** (Luerssen) C. Christensen, Rob. vol. 40, p. 223.—*Asplenium Fenzlianum* Luerssen, Hill. p. 613.

Endemic.

66. **D. Arnottii** Brackenridge, Rob. vol. 40, p. 223.—*Asplenium Arnottii* Baker, Hill. p. 610.

Endemic. Related to some other large tripinnate species of Polynesia and Tropical Asia.

67. **D. sandwichianum** (Presl) Diels, Rob. vol. 40, p. 224.—*Asplenium sandwichianum* Hooker, Hill., p. 612.

Endemic.

68. **Asplenium nidus** Linnaeus, Hill. p. 587.—*Neottopteris nidus* (Linnaeus) J. Smith, Rob. vol. 40, p. 206.
Tropical Asia, Australia, Polynesia and Madagascar.

69. **A. trichomanes** Linnaeus, Hill. 587, Rob. vol. 40, p. 210.
Through the northern temperate zone, reaching south to tropical mountains.

70. **A. monanthes** Linnaeus, Rob. vol. 40, p. 210; Hill, p. 587.
Temperate and tropical Africa with islands, tropical America.

71. **A. pavonicum** Brackenridge, Rob. vol. 40, p. 211.—*A. normale*. Hill. p. 588.
Endemic, near to the former species and especially to the Asiatic *A. normale* Don.

72. **A. unilaterale** de Lamarck, Rob. vol. 40, p. 209.—*A. resectum* Smith, Hill. p. 588.
Tropical Africa, Asia and Polynesia.

73.* **A. rhomboideum** Brackenridge, Rob. vol. 40, p. 209 (excl. syn.). —*A. fragile* Hill. p. 589.
Endemic, allied to some Andine species.

74.* **A.** (erectum subspecies) **sphenolobium** Zenker; Hieronymus, Hedwigia vol. 60, p. 226. 1918.—*A. erectum* Hill. p. 589 pro parte. *A. lunulatum* pro parte Rob. vol. 40, p. 210.
var. **diplazisora** Hieronymus, l. c. p. 229.
India, Java, Samoa, East Africa.

75.* **A. Macraei** Hooker et Greville, Rob. vol. 40, p. 215. Hieronymus, l. c. 230.—*A. erectum*. var. *Macraei* Hillebrand 290 pro parte.
—var. **stricta** (*Brackenridge*) Hieronymus, l. c. p. 231.—*A. strictum* Brackenridge, *A. erectum β myriophyllum* Hill. p. 591.
var. **angustifolia** Hieronymus, l. c. p. 232.
Endemic.

76. **A. varians** Hooker et Greville, Hill. p. 591. Rob. vol. 40, p. 215.
East and South Asia.—I have seen no specimens from the Hawaiian islands and have some doubt of the occurrence of this species there.

77.* **A. Kaulfussii** Schlechtendal, Hill. p. 592, Rob. vol. 40, p. 212.
Endemic.

78.* **A. kauaiense** (Hillebrand) Rob. vol. 40, p. 222. *A. Mannii* var. *kauaiense*, Hill. p. 595
Endemic.

79.* **A. enatum** Brackenridge, Hill. v. 593, Rob. vol. 40, p. 212.
Endemic.

80.* **A. Hillebrandii** C. Christensen, Rob. vol. 40, p. 212.—*A. Mannii* Hill. p. 594
Endemic.

For *A. bipinnatum* Hill. p. 595. *A. Lydgatei* Hill. p. 596 and *A. meiotomum* Hill. p. 596, see critical notes below.

81.* **A. lobulatum** Mettenius, Hill. 598, Rob. vol. 40, p. 214.—*A. pseudofalcatum* Hill. p. 597, Rob. vol. 40, p. 211.
Samoa, New Guinea, (Formosa?).

82.* **A. contiguum** Kaulfuss, Hill. p. 600, Rob. vol. 40, p. 213.
Type from Oahu and the species perhaps endemic to the islands, but very similar forms occur in Malaya and East Africa.

var. **hirtula** C. Christensen n. var.
Maui, Haleakala, Skottsberg No. 866!

83. **A. nitidulum** Hill. p. 601, Rob. vol. 40, p. 213.
Endemic.

84. **A. Knudsenii** Hill. p. 601.
Endemic. An obscure species.

85. **A. caudatum** Forster, Hill. p. 602, Rob. 40, p. 213.—*A. spathulinum* Hill. p. 604.
Tropics of Africa, Asia and Polynesia.

86. **A. horridum** Kaulfuss, Hill. 603, Rob. vol. 40, p. 214.
Endemic? Similar forms in Central Polynesia and Malaya.

87. **A. rhipidoneuron** Robinson, Rob. vol. 40, p. 217.—*A. furcatum,* Hill. p. 604.
Endemic. A subspecies of the world-wide *A. furcatum* Thunberg (*A. praemorsum* Swartz).

88. **A. insiticium** Brackenridge, Rob. vol. 40, p. 217.—*A. insiticium,* Hill. p. 598.
Endemic.

89. **A. cuneatum** de Lamarck, Rob. vol. 40, p. 218.
Most tropical countries. Listed upon the authority of Robinson only.

90. **A. sphenotomum** Hillebrand, Hill. p. 599. Rob. vol. 40, p. 219.
Endemic. Probably a large, more divided form of *A. insiticium* Brack.

91. **A. adiantum nigrum** Linnaeus, Hill, p. 606. Rob. vol. 40, p. 218.
Europe, Africa and temperate Asia.

92.* **A. acuminatum** Hooker et Arnott, Hillebrand p. 606, Rob. vol. 40, p. 216.—*A. polyphyllum* Presl, Hill. p. 607. *A. Goldmannii* Underwood, Rob. vol. 40, p. 216.
Endemic.

93. **A. patens** Kaulfuss, Hill. p. 608, Rob. vol. 40, p. 218.
Endemic. Related to the common Asiatic-Polynesian *A. laserpitiifolium* de Lamarck.

94. **A. vexans** Heller, Minn. Bot. Studies, vol. 1, p. 776, 1897, Rob. vol. 40, p. 219.
Endemic. Unknown to me.

95. **A. schizophyllum** C. Christensen, Rob. vol. 40, p. 219. *A. dissectum* Brackenridge, Hill. p. 605.
Endemic.

96.* **A. Baldwinii** Hill. p. 618.—*Athyrium Baldwinii* C. Christensen, Rob. vol. 40, p. 222.
Endemic.

97.* **Loxoscaphe Mannii** (Eaton) Kuhn, v. Decken's Reise vol. 3, Bot. 37, 1879.—*Microlepia Mannii* Eat., *Davallia Mannii* Baker, *Lindsaya Mannii* Hill. p. 624. *Humata? Mannii* Diels, *Diellia Mannii* Rob. vol. 39, p. 582.
Endemic.

98. **Blechnum occidentale** L.
A common species in tropical America, introduced into gardens in the Hawaiian islands and therefrom escaped. Specimens from Oahu: Waianae Mountains, Makaleha Valley, were collected August 30, 1922, by Skottsberg, No. 400. First discovered by H. L. Lyon several years ago.

99.* **Sadleria Souleyetiana** (Gaudichaud) Moore, Hill. p. 581, Rob. vol. 40, p. 225.
Endemic.
Note: The original spelling of the name is *Souleyetiana,* not *Souleytiana* as written by Hillebrand, Robinson, and others.

100. **S. cyatheoides** Kaulfuss, Hill. p. 582, Rob. vol. 40, p. 226. *S. pallida* Hooker et Arnott.
Endemic? Is said to occur in Sumatra.

101. **S. Hillebrandii** Rob. vol. 40, p. 226, pl. 11.—*S. pallida* Hill. p. 582 (not Hooker et Arnott).

Endemic.

102.* **S. polystichoides** (Brackenridge) Heller, Rob. vol. 40, p. 227.—*S. squarrosa* (Gaudichaud-Beaupré) Hill. p. 582.

var. *unisora* (Baker) C. Christensen.—*Polypodium unisorum* Baker. *Sadleria squarrosa* var. *depauperata* Hill. p. 583. *S. unisora* Rob. vol. 40, p. 227, pl. 12. *Gymnogramme sadlerioides* Underwood.

Endemic.

103. **Doodia Kunthiana** Gaudichaud, Rob. vol. 40, p. 228.—*D. media* Hill. p. 584.

Endemic. Closely related to *D. media* R. Brown of Australia and New Zealand.

104.* **Coniogramme pilosa** (Brackenridge) Hieronymus, Hieron. Hedwigia vol. 57, p. 312, 1916.—*C. fraxinea* Rob. vol. 39, p. 589, *Gymnogramme javanica* Hill. p. 550.

Endemic?

105. **Ceropteris ochracea** (Presl) Rob. vol. 39, p. 588.

An introduced species, native of South America and now found in many tropical countries; originally escaped from gardens.

106. **Pellaea ternifolia** (Cavanilles) Link, Hill. p. 633, Rob. vol. 39, p. 576.

Tropical and subtropical America.—No definite locality in Oahu is stated by Hillebrand or Robinson; it was collected at that island, north slope of Kaala by Skottsberg, No. 368!

107. **Doryopteris decora** Brackenridge, Rob. vol. 39, p. 577.—*Pteris decora* Hooker, Hill. p. 630.

Endemic.

108. **D. decipiens** (Hooker) J. Smith, Rob. vol. 39, p. 576.—*Pteris decipiens* Hooker, Hill. p. 629.

Endemic.

Both Hawaiian species of Doryopteris are related to South American species.

109. **Hypolepis punctata** (Thunberg) Mettenius, Rob. vol. 39, p. 578.—*Phegopteris punctata* Mett., Hill. p. 562.

var. *flaccida* Hill 563.—*H. flaccida* Rob. vol. 39, p. 579.

Recorded from tropical Africa, Asia, Australia and Polynesia, extending

northwards to Japan, southwards to New Zealand; related species occur in tropical America. Hawaii: Kohala Mountains, Skottsberg No. 713! Maui: Haleakala, Skottsberg No. 848!

H. rugosula (Labill.) J. Smith (with the wrong spelling *rugulosa*);(?) *Phegopteris punctata* var. *rugulosa* Hill. 563 is doubtfully indigenous in the islands.

110. **Adiantum capillus veneris** Linnaeus, Hill. p. 634, Rob. vol. 39, p. 576.

Most tropical and subtropical countries, often escaped from cultivation.

(*A. Bennettii* Carruthers, Hill. p. 634, must be excluded from the list of Hawaiian ferns until further notice.)

111. **Pteris longifolia** Linnaeus.

In most tropical and subtropical countries, often escaped from cultivation, thus in Hawaii: crater of Kilauea, hot crack along lava bed, Skottsberg No.552!

112. **P. cretica** Linnaeus, Hill. p. 627, Rob. vol. 39, p. 573.

Most tropical and subtropical countries.

113. **P. irregularis** Kaulfuss, Hill. p. 628, Rob. vol. 39, p. 574.

Endemic. A rather isolated type.

114. **P. excelsa** Gaudichaud, Hill. p. 629. Rob. vol. 39, p. 573.

Endemic? Very similar form in East Central Asia, Malaya and Polynesia.

115. **Schizostege Lydgatei** (Baker) Hill. p. 632, Rob. vol. 39, p. 579, pl. 41.

Endemic. A very problematic plant.

116. **Pteridium aquilinum** (Linnaeus) Kuhn, Hill. p. 631, Rob. vol. 39, p. 575.

Cosmopolitan.

117. **Vittaria rigida** Kaulfuss, Rob. vol. 39, p. 587.—*V. elongata* Hill. p. 551.

Perhaps endemic, but plants from Asia and from other Polynesian islands are often named *V. rigida.* It is a subspecies of the common *V. elongata* which occurs in tropical Asia and Polynesia.

118. **Polypodium** (Xiphopteris) **Saffordii** Maxon, Rob. vol. 40, p. 197.—*P. serrulatum* Hill. p. 553.

Endemic. A near ally of *P. serrulatum* (Swartz) Mettenius of tropical America and Africa.

119. **P.** (Eupolypodium) **Hookeri** Brackenridge, Hill. p. 553, Rob. vol. 40, p. 194.
Polynesia (Fiji); relatives in Malaya and tropical Australia.

120. **P.** (Eupolypodium) **Knudsenii** Hieronymus, Rob. vol. 40, p. 195.—*P. samoense* var. *glabra* Hill. p. 555.
Endemic; allied to the former species.

121. **P.** (Eupolypodium) **pumilum** Rob. vol. 40, p. 195.
Endemic, unknown to me. If a valid species the name must be changed because of *P. pumilum* Brause, Engl. Jahrb. vol. 49, p. 38, 1912, a species from New Guinea.

122. **P.** (Eupolypodium) **pseudogrammitis** Gaudichaud-Beaupré Hill, p. 553, Rob. vol. 40, p. 196.
Endemic. Allied species in Polynesia and Malaya.

123. **P.** (Eupolypodium) **Haalilioanum** Brackenridge, Hill. p. 554, Rob. vol. 40, p. 197.
Endemic. Very near the Malayan *P. subpinnatifidum* Blume.

124. **P.** (Eupolypodium) **sarmentosum** Brackenridge, Hill. p. 554, Rob. vol. 40, p. 197.
Endemic, several related species in most tropical countries.

125. **P.** (Eupolypodium) **adenophorus** Hooker et Arnott, Hill. p. 555, Rob. vol. 40, p. 198.
Endemic. As the former.

126.* **P.** (Eupolypodium) **pellucidum** Kaulfuss, Hill. p. 557, Rob. vol. 40, p. 198.
Endemic. A representative of *P. vulgare* in the islands.

127.* **P.** (Adenophorus) **hymenophylloides** Kaulfuss, Hill. p. 555, Rob. vol. 40, p. 199.
Endemic.

128.* **P.** (Adenophorus) **abietinum** D. C. Eaton, Rob. vol. 40, p. 201.—*P. tamariscinum* var. *abietinum* Hill. p. 557.
Endemic.

129.* **P.** (Adenophorus) **Hillebrandii** Hooker, Hill. p. 555, Rob. vol. 40, p. 200.
Endemic.

130.* **P.** (Adenophorus) **tamariscinum** Kaulfuss, Hill. p. 556, Rob. vol. 40, p. 200.
Endemic.

131.* **P.** (Adenophorus) **tripinnatifidum** (Gaudichaud), Presl, Rob. vol. 40, p. 200.—*P. tamariscinum* var. *tripinnatifidum* Hill. p. 586.
Endemic.

132.* **P.** (Clathropeltis) **lineare** Thunberg, Hill. p. 558.—*Phymatodes elongata* (Kaulfuss), Rob. vol. 40, p. 201.
East and Central Asia. Several related forms in Asia and Africa.

133. **P.** (Phymatodes) **spectrum** Kaulfuss, Hill. 559, Rob. vol. 40, p. 201.
Endemic. Rather unique, but allied to some species of tropical Asia.

134. **P.** (Phymatodes) **phymatodes** Linnaeus.
Introduced? Maui: Keanae village, Skottsberg No. 801!—A most common form in Polynesia, tropical Asia and Africa.

135. **P.** (Phlebodium) **aureum** Linnaeus, Rob. vol. 40, p. 202, pl. 9.
Tropical America. No doubt escaped from cultivation.
Note: *P. lanceolatum* Linnaeus, Hill. p. 559, is scarcely indigenous in the islands, and provisionally must be excluded from the list of Hawaiian ferns.

136. **Elaphoglossum micradenium** (Fée) Moore, Rob. vol. 39, p. 570.—*Acrostichum micradenium* Fée, Hill. p. 548.
Endemic. A rather isolated type within this large genus.

137. **E. aemulum** (Kaulfuss) Brackenridge, Rob. vol. 39, p. 571.—*Acrostichum conforme* Hill. p. 549.
Probably endemic; the wide distribution given by Robinson is referable to the collective species, *E. conforme,* to which several authors refer also *E. aemulum.*

138.* **E. Wawrae** (Luerssen) C. Christensen, Rob. vol. 39, p. 571 pro parte.—*Acrostichum Wawrae* Luerss. Hill. p. 549.
Endemic.

139. **E. gorgoneum** (Kaulfuss) Brackenridge, Rob. vol. 39, p. 572.—*Acrostichum gorgoneum* Kaulfuss, Hill. p. 550.
Endemic?, related or identical forms occur in other Polynesian and Malesian islands.

140. **E. reticulatum** (Kaulfuss) Gaudichaud, Rob. vol. 39, p. 572.—*Acrostichum reticulatum* Kaulfuss, Hill. p. 550.
Endemic, a rather isolated type.

141.* **E. tahitense** Brackenridge.—*E. Wawrae* Rob. vol. 39, p. 571 pro parte pl. 40.
Maui: Haleakala, Kula pipe line, 1200 m., C. Skottsberg No. 883! New

for the Hawaiian Islands, previously known from Tahiti, Easter Island and Fiji.

142. **E. hirtum** (Swartz) C. Christensen, Rob. vol. 39, p. 570.—*Acrostichum squamosum* Hill. p. 549.
var. **micans** (Mett.) C. Christensen.—*Acrostichum micans* Mettenius, tropical America and Africa. The Hawaiian form (var. *micans*) looks rather different from the West Indian type and should perhaps be considered a distinct species.

MARSILEACEAE

143. **Marsilea villosa** Kaulfuss, Hill. p. 650, Rob. vol. 39, p. 233.
Endemic. Closely related to the American *M. vestita.*
M. crenulata Desvaux, Hill. p. 143, should provisionally be excluded from the list of Hawaiian Pteridophyta.

LYCOPODIACEAE

144. **Lycopodium serratum** Thunberg, Hill. p. 642, Rob. vol. 41, p. 52.
Japan, China, tropical Asia and Polynesia.

145. **L. haleakalae** Brackenridge, Hill. 643. Rob. vol. 41, p. 52.
Endemic. Represents the wide-spread *L. selago* in the islands.

146. **L. erubescens** Brackenridge, Hill. p. 643, Rob. vol. 41, p. 53.
Endemic. A variety of the former species?

147. **L. polytrichoides** Kaulfuss, Hill. p. 643, Rob. vol. 41, p. 56.
Endemic. Allied to *L. verticillatum* Linnaeus (America, South Africa, Polynesia).

148. **L. phyllanthum** Hooker et Arnott, Rob. vol. 41, p. 54, pl. 2.—*L. pachystachyon* var. *phyllanthum* Hill. p. 644.
Malaya, Polynesia.

149. **L. nutans** Brackenridge, Hill. p. 644, Rob. vol. 41, p. 54, pl. 1.
Endemic? By Baker (Handbook of Fern-Allies p. 23) with similar forms from Madagascar and New Caledonia referred to the former species as a variety.

150. **L. phlegmaria** Linnaeus, Hill. p. 645, Rob. vol. 41, p. 53.
Tropics of the Old World.

151. **L. cernuum** Linnaeus, Hill. p. 645, Rob. vol. 41, p. 53.
Cosmopolitan in the Tropics.

152. **L. venustulum** Gaudichaud-Beaupré, Hill. p. 645, Rob. vol. 41, p. 55.
Endemic. A close ally of the wide-spread *L. clavatum* Linnaeus.

153. **L. volubile** Forster, Hill. p. 646, Rob. vol. 41, p. 55.
Polynesia, Australia, Malaya.

PSILOTACEAE

154. **Psilotum nudum** (Linnaeus) Grisebach, Rob. vol. 41, p. 56.—*P. triquetrum* Swartz, Hill. p. 646.
Cosmopolitan within the Tropics and Subtropics.

155. **P. complanatum Swartz,** Hill. 6. 647, Rob. vol. 41, p. 57.
Cosmopolitan within the Tropics.

SELAGINELLACEAE

156. **Selaginella deflexa** Brackenridge, Hill. p. 648, Rob. vol. 41, p. 58.
Endemic. A near ally of the northern *S. selaginoides.*

157. **S. parvula** Hill. p. 648, Rob. vol. 41, p. 58.
Endemic. By Hieronymus placed close to the American *S. radiata* (Aublet) A. Braun, but probably a young form of *S. arbuscula* (v. Rob. vol. 41, p. 59).

158. **S. arbuscula** (Kaulfuss) Spring, Hill. p. 648, Rob. vol. 41, p. 58.
Endemic. Allied species in tropical America and Central Polynesia.

159. **S. Menziesii** (Hooker et Greville) Spring, Hill. p. 648, Rob. vol. 41, p. 58.—*S. Springii* Gaudichaud, Hill. p. 649, Rob. vol. 41, p. 59.
Endemic. Allied to *S. arbuscula. S. Springii* seems to me to be a form of *S. Menziesii;* gradual transitions occur.

CRITICAL NOTES ON SOME SPECIES

Gleichenia glauca (Thbg.) Hook.

From an examination of the specimens at hand I am unable to draw a definite line between the Hawaiian and the Asiatic forms of *G. glauca;* nevertheless, it is probable that some differences are constantly being found —such as the presence of scales in the Hawaiian form, which might more properly be referred to *G. glauca* as var. *pinnata* (Kze.) (Mertensia Kze.), but Robinson was scarcely right in adopting two species (*Dicranopteris glauca* and *D. glabra*). Contrary to the statement of Hillebrand, who separated a form (*Mertensia glabra* Brack.) by the character: "lowest segments again pectinate," Robinson ascribes to her *D. glauca* this character: "lower segments lobed and overlapping the rachis;" to *D. glabra,* "lower segments entire."

Trichomanes saxifragoides Pr.

The original *T. parvalum* Poiret was described from a specimen from Madagascar leg. Thouars, and the keen monographer of the genus, Van den Bosch, considered it specifically distinct from the common Polynesian form described by Presl as *T. saxifragoides,* which by most authors is named *T. parvulum.* I must confess that I see no clear difference between them. Having seen no genuine *T. parvulum,* I prefer to give the Polynesian species the safer name, *T. saxifragoides.* It is widely distributed in Polynesia and a very similar form (also named *T. parvulum* by most authors) appears in Japan, China, Assam and Malaya. The species belongs to the subgenus Gonocormus, all species of which are from the Old World. *T. Philippianum* Sturm from Juan Fernandez, previously placed under Gonocormus, belongs to Eutrichomanes.

Trichomanes cyrtotheca Hill.

Hymenophyllum obtusum Hook. et Arn.

Recorded from New Guinea, but the determination is probably false. A related form from Amsterdam Island (Southern Indian Ocean) was named *H. obtusum* by Hemsley (Challenger Exp. Bot. p. 271), but belongs rather to an allied species: *H. aeruginosum* Carm.

H. lanceolatum Hook. et Arn.

Very closely related to *H. ferrugineum* Colla from Juan Fernandez and southern Chile. It also can scarcely be distinguished from *H. Frankliniae* Colenso from New Zealand. *H. aeruginosum* Carm. from Tristan d'Acunha and Amsterdam Island (see *Hymenophyllum obtusum*) is a third very simi-

lar species. All three species and *H. lanceolatum* may be regarded as forms of *H. ciliatum* Sw., taken in a broad sense and are widely dispersed through tropical America and Africa.

Dryopteris truncata (Gaud.) O. Ktze.

Provisionally I have used this name for a fern common in tropical Asia and Polynesia; still, I suspect that it cannot stand, since the original *Polypodium truncatum* Poiret is an American species unknown till now, but certainly widely different from our species. Our plant is *Polypodium truncatum* Gaud. Freyc. Voy., which again is variable and includes several rather distinct forms; the Hawaiian form is *Nephrodium Hudsonianum* Brack.

Dryopteris stegnogrammoides (Bak.) C. Chr.

This endemic species is incorrectly placed in Index Filicum under the subgenus Stegnogramme. Its real affinity apparently is with *D. cyatheoides* (Klf.) O. Ktze., a member of the subgenus Cyclosorus and not with the Asiatic *D.* (Stegnogramme) *stegnogramme* (Bl.) C. Chr. It was collected by Skottsberg in Hawaii (No. 419!), Oahu (No. 151!), and Maui (No. 837!).

Dryopteris paleacea (Sw.) C. Chr.

I have tried in vain to find good characters by which the Hawaiian representative of *D. filix mas* may be safely distinguished from the American *D. paleacea* (Syn. *Aspidium parallelogrammum* Kze.). Robinson regarded a form with darker scales as a distinct species, *D. fusco-atra* (Hill.), but I cannot agree with her in this. In nearly all subspecies of *D. filix mas* are found forms with lighter and darker scales. The var. *fusco-atra* seems to be a larger form with less truncate segments, and to make a transition to *D. hawaiiensis.*

Dryopteris hawaiiensis (Hill.) Rob.

In its most divided form this is certainly very different in habit from the former species, but nevertheless it is probably only a form. Skottsberg No. 756! from Maui is almost exactly intermediate in cutting between *D. paleacea* var. *fusco-atra* and the large tripinnatifid *D. hawaiiensis.* I call the attention of field workers to the fact that in other countries similar bipinnatifid and tripinnatifid forms appear within the narrow group of *D. filix mas,* which by several authors are considered forms of one species; in tropical Asia, for example, forms very much resembling *D. paleacea,* (*D. filix mas* subsp. *fibrillosa* Clarke) and others like *D. hawaiiensis* (*Aspidium marginatum*). In the field it should be possible to

arrive at a definite conclusion regarding the validity of the two Hawaiian species adopted here. It is possible that the variation in cutting bears some relation to age.

The Hawaiian species of Dryopteris with decompound leaves (Nos. 34-42) are not very well understood, and authors have dealt with them rather differently. As to their systematic position, at least the first four are genuine members of the subgenus Ctenitis, the species of which nearly always can be recognized by the pubescence of articulated reddish hairs on the costae and costules above, and by the more or less scaly stipe and rachis. It is doubtful whether *D. latifrons* (Brack.) O. Ktze. and *D. honolulensis* (Hook.) C. Chr. really are two distinct species; they should be carefully observed and compared in a living state and in different ages. The remaining species (Nos. 38-42) are all intimately related and perhaps all forms of a single species. They belong to a group of the genus which is especially well represented in Polynesia and so far can very naturally be placed under the subgenus Parapolystichum Keys. emend. C. Chr. Mon. II. The species of this subgenus have all decompound deltoid leaves, glabrous or slightly scaly, costae and costules margined above with a furrow and glabrous. The five Hawaiian species belonging here are said to be endemic, but very similar species are found in Central and Southern Polynesia.

After examination of the material of *D. glabra* in the Botanical Museum of Dahlem, Berlin, I cannot agree with Robinson in considering *D. nuda* Und. a good species. However, her *D. parvula* seems to be a distinct form worthy of specific rank. Robinson's key to these species is very misleading. Plants that otherwise cannot be distinguished from *D. glabra* may be densely glandular beneath (Maui, Skottsberg No. 757!) and should, with Robinson, be referred to *D. latifrons,* which species in all respects is totally different, while *D. parvula* may be found without glands.

The three exindusiate species: *D. crinalis* (Hook. et Arn.) C. Chr., *D. unidentata* (Hook. et Arn.) C. Chr., and *D. acutidens* C. Chr. are very intimately related and it seems very probable that *D. acutidens* is a more finely dissected form of *D. unidentata.*

D. carvifolia (Kze.) C. Chr.

Now generally placed under the genus Polystichum. It belongs, however, to a small group of species, which I have (in the second part of my Monograph of the genus Dryopteris, Vid. Selsk. Skrifter, Copenhagen VIII, vol. 6; 101, 1920) named Polystichopsis and placed as a subgenus under Dryopteris. *D. carvifolia* has several close relatives scattered through the warmer regions.

Polystichum haleakalense Brack.

Belongs to the same group as *P. Braunii* (Spenn.) Fée, a species of a wide distribution in the mountains of Europe, Central and East Asia and North America, but I agree with Robinson in considering it a distinct species. It is probably more closely related to certain forms from West China and North India, which appear to be forms of a single variable species: *P. Prescottianum* (Wall.).

Cyrtomium Boydiae (D. C. Eaton) Rob.

It is probable that Hillebrand was right in considering this plant a form of *Dryopteris cyatheoides;* the question should be solved through studies in the field.

Diellia Brack.

The genus is endemic in the Hawaiian islands; its systematic position is not settled, but it seems to be a derivative of Lindsaya. Hillebrand described seven species and Robinson has adopted them as distinct. I have, therefore, enumerated them all in the list, although I believe that only two or three really good species can be upheld. The eighth species referred hereto by Hillebrand and Robinson, *D. Mannii,* is totally different from the other seven species and I place it in the genus Loxoscaphe (p. 27).

Lindsaya repens var. **Macraeana** (Hook. et Arn.) C. Chr.

Robinson is of opinion that the Hawaiian form (*Davallia Macraeana* Hook. et Arn.) can be separated from the typical *L. repens* by its submarginal sori. It is true that all specimens seen by me have the sori at some distance from the margin, but I have specimens from Malaya, undoubtedly belonging to *D. repens,* in which the position of the sori is quite the same. The Hawaiian form was beautifully figured in Voyage de la frégatte de Vénus. Bot. t. 6. under the name *Saccoloma sandwicense* Brongn. not quoted by Robinson. The genus Odontoloma should, I think, be adopted.

Athyrium proliferum (Klf.) C. Chr.

I agree with Hillebrand in adopting one species only, while Robinson without comments has two: *A. proliferum* and *A. deparioides.* In *A. deparioides* the sori protrude beyond the margin and sometimes are even stipitate, while in *A. proliferum* they are placed within the margin. In the collection of Skottsberg both forms are found, but besides specimens (No. 226! Oahu), which are intermediate between them. In all other characters I see no essential difference between the two forms. It should be worth while to study these forms in the field so as to decide whether more than one species exists.

Athyrium Poiretianum (Gaud.) Pr.

Generally united with the African *A. scandicinum* (Willd.) Pr., but apparently well characterized. As a rule it is much larger than *A. scandicinum* and more finely cut, with narrower and more deeply pinnatifid tertiary pinnules; the basal pair of pinnae are scarcely reduced, while in *A. scandicinum* they are conspicuously reduced.

Asplenium rhomboideum Brack.

Referred to *A. fragile* Pr., an Andine species, by Hillebrand and several other authors, but I agree with Robinson in considering the Hawaiian fern a distinct species. It is, however, a mistake when Robinson quotes *A. stoloniferum* Presl as a synonym of *A. rhomboideum,* since that name is a synonym of *A. fragile. A. stoloniferum* Pr. 1825 (not Bory) was by Presl changed to *A. fragile,* 1836.

Asplenium sphenolobium Zenker and **A. Macraei** Hook. et Grev.

These species both belong to a group of Asplenia which is represented in most warmer countries, and all the forms are by some authors referred to a single species, *A. lunulatum* Sw.; by others, to two, *A. lunulatum* Sw. and *A. erectum* Bory. In recent time the late Prof. Georg Hieronymus, of Berlin, has described a large number of species that all fall under this group, and he has referred the Hawaiian forms to the two species named in Nos. 74 and 75. I am nearly convinced that the two "species" are forms of a single one, which should be named *A. Macraei* Hook. and Grev. (Icon. Fil. t. 217), but this appears to be well distinguished from other forms of the group. The typical *A. Macraei* is nearly or fully bipinnate, while *"A. sphenolobium"* is pinnate with more or less lobed pinnæ.

The species or forms of the group of **Asplenium Kaulfussii** (Nos. 77-80) seem very difficult to delimitate, at least with nothing but herbarium material at hand, and they seem to be connected through numerous intermediate forms, so it may be asked whether really four distinct species occur in the island. Hillebrand has described three more species: *A. bipinnatum,* Hill. p. 595 (*A. parallelum* Bak., Rob. vol. 40, p. 218). *A. Lydgatei* Hill. 596, Rob. vol. 40, p. 216 and *A. meiotomum* Hill. 596, Rob. vol. 40, p. 220. I have examined Hillebrand's specimens and I am fully convinced that these three "species" are abnormally cut forms of either *A. Kaulfussii* or *A. enatum.*

Asplenium lobulatum Mett.

Hieronymus has shown (Hedwigia vol. 61, p. 39, 1919) that there does not exist any difference between *A. lobulatum* Mett. and *A. pseudofalcatum*

Hill., and judging from the collection of Berlin and the specimens collected by Skottsberg, his opinion is quite correct.

Asplenium contiguum Klf. var. **hirtulum** C. Chr. n. var.

Smaller than the type (sometimes only 10 cm. long) from which it differs by the densely hairy stipe, rachis and surfaces; hairs short, thick, articulated. This is certainly not the var. *pumilum* of Hillebrand (601), who says: "A hairy rachis, as figured in No. 2 of the plate in the Sp. Fil. I have never met with." Var. *hirtulum* is a critical form, perhaps a distinct species. The sori are shorter and thicker and not so close to the midrib as in *A. contiguum,* the upper base of the pinnæ rounded, not auricled, the margins very slightly incised and finely serrate. The variety is in some respects intermediate between typical *A. contiguum* and *A. nitidulum* Hill.

Asplenium acuminatum Hook. et Arn.

In the list (No. 91) I have united *A. acuminatum* Hook. et Arn. et *A. polyphyllum* Pr. into one species, and I believe I am right in doing so. The form most often called polyphyllum is large with the pinnules somewhat incised, but a cotype of *A. polyphyllum* Pr. in Herbarium Berlin from Oahu leg. Meyen comes very near to the figure of *A. acuminatum* Hook. Spec. Fil. vol. 3, p. 206.

Asplenium Baldwinii Hill.

To this species I refer specimens from Kauai, forests near Kokee, Skottsberg No. 934! and if my identification is right the species does not belong to Athyrium but is a genuine Asplenium with clathrate scales. It is a very finely dissected fern, in habit not unlike *Loxoscaphe Mannii.* Rhizome apparently short-creeping, densely covered at the top with dark-brown lanceolate hair-pointed, narrow scales.

Loxoscaphe? Mannii (Eaton) Kuhn.

As seen from the list of synonyms this remarkable endemic fern has been referred to six different genera. Most authors have placed it within the Davallieae, and it must be granted that in soral characters it shows some resemblance to Odontosoria. Hillebrand placed it in Lindsaya and Robinson in Diellia, but certainly it has nothing to do with these genera. After an examination of several specimens I come to the same conclusion as Kuhn that the species has its nearest relatives in the genus Loxoscaphe, a small group of ferns of asplenioid habit but with davallioid sori. It was accordingly referred to Davallia by Hooker and Baker, by Diels in Natürl. Pflanzenfamilien to Asplenium as a subgenus. Loxoscaphe as limited by Kuhn (l. c.) includes three or four species which are scarcely near relatives, among

them *L. Mannii* and *L. foeniculaceum* (Hook.) Moore (*Asplenium stenolobum* C. Chr. Ind.) from Fiji, and I believe that these two species are colsely related.

I call the attention of Hawaiian botanists to this peculiar fern, the systematic position of which is still doubtful.

Sadleria.

Hillebrand as well as Robinson adopts three arborescent species of this small genus, which probably is endemic in the islands where it represents the large genus Blechnum, which, curiously enough, is quite absent from the archipelago. The three arborescent species are closely related and from dried material alone it is sometimes difficult to distinguish them. A detailed monograph of the genus based upon field-studies is highly needed. To the fourth species: *S. polystichoides* (Brack.) Heller, I refer as a variety *S. unisora* (Bak.) Robinson, because the only specimens collected by Skottsberg (Maui No. 849!) are intermediate between the genuine *S. polystichoides* and the small *S. unisora.* It should be interesting to study these dwarf forms in nature and to try to solve the question if they are young fertile plants or fixed varieties or species. Skottsberg has gathered a curious, small, very puzzling fern on Mt. Haleakala, Maui (No. 1100!) It resembles in habit, size, scales and sori *Sadleria unisora,* but its thin texture and distinct veins show that it is a quite different thing, and in reality it is a dwarf form of *Dryopteris crinalis* (Hook. et Arn.) C. Chr.

Coniogramme pilosa (Brack.) Hieron.

Probably an endemic subspecies of *C. fraxinea* (Don) Fée, of which a series of forms occur in tropical Asia and Polynesia and two or three in Africa; by Hieronymus (Hedwigia vol. 57, 1916) they are all considered good species. The Hawaiian form is well marked; the same or a nearly related plant occurs in the Fiji Islands.

Polypodium pellucidum Klf.

A variable species, perhaps including more distinct varieties. The most remarkable form is found in the higher regions of the volcanos. Its pinnæ are often stiffly erect, imbricating and folded ventrally upon the midrib. Skottsberg was of opinion that this form is a stable one.

Polypodium subg. *Eupolypodium* Sect. *Adenophorus* (nos. 126-130).
Eupolypodium Sect. Adenophorus (n. 126-130).

A specialized group of the genus, comprising three to five species, all Hawaiian. Robinson has adopted five species; Hillebrand, three with sev-

eral varieties; the species are evidently variable and their accurate number is not known yet.

Polypodium lineare Thbg.

The Hawaiian form of this species very much resembles the Japanese type, but some minor differences may be found, because of which the form should perhaps be treated as a variety or subspecies of *P. lineare* (var. *elongatum* Klf.). All synonyms quoted by Robinson do not refer to the Hawaiian form; on the other hand, she has omitted *P. atropunctatum* Gaud., which name should be used for the Hawaiian form, if one prefers to deal with it as a species. The specific name elongatum is preoccupied in the genus.

Elaphoglossum tahitense Brack.

A rather small species, easily known from all others occurring in the islands by its ovate, entire, pale-brown scales of the rhizome, stipe and lower part of the mid-rib, and by the lower surface of the blade being furnished with some very minute appressed scales. The few specimens collected are small, stipe 1-2 cm. long, blade 5-7 cm. long by 1-1.2 cm. wide, the fertile ones equal but on longer stalks, shortly decurrent below, the apex acute, texture thick. Robinson's plate 40 (vol. 39) (*"E. Wawrae"*) evidently illustrates *E. tahitense,* which she seems to have confounded with *E. Wawrae.* This is, according to the descriptions, a quite different plant, closely related to *E. aemulum,* with glossy black-brown, ciliate scales on the rhizome, and with larger and naked leaves.

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